

PATENT

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October 7, 2002

J. Michael Neary

Oct 7, 2002

Date

Inventor: Gabrys &amp; Simmons

)

)Group Art Unit: 3682

Serial No.: 09/630,157

)

)Examiner: Chong Hwa Kim

Filed: July 31, 2000

)

For: "Flywheel Hub-to-Rim Coupling")

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GROUP 3600

**AFFIDAVIT OF DENNIS SIMMONS UNDER RULE 132**

OFFICIAL

Honorable Commissioner for Patents  
Washington, DC 20231

Sir;

1. My name is Dennis Simmons and this is my affidavit of facts and opinions in support of the patentability of the claims in the above-identified application.
2. I am now and since October 3, 1996, have been the Sr. Process Engineer of Composites Development Center at Toray Composites (America), Inc. in Tacoma, Washington, assignee of this Application. Prior to that time, from November 4, 1966 to October 3, 1996, I was employed at Lincoln Composites in Lincoln, Nebraska in various production and management positions.
3. I am familiar with the disclosure and claims in this Application which covers an invention made by my co-inventor and I, and I have read and am familiar with the Examiner's Final Rejection dated June 7, 2002. I believe that the basis for the Examiner's conclusions that the inventions claimed in this application are unpatentable

are factually and technically incorrect. I will explain the reasons for these conclusions in detail below.

4. Claims 1-8 and 10-20 have been rejected as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and use the invention. Specifically, the Examiner asserts that the variables dealing with the characteristics of each material used are not provided in the specification, and he further asserts that, without the exact composition of the material and its values, such as modulus of elasticity or density, making the invention is very difficult to carry out.

5. The specification, in the first two paragraphs on page 7, explains the relationship between the rim liner materials and the rim materials as follows:

The rim liner 45 is made of a material such as nylon or PVC that has a elastic modulus in the hoop direction,  $E_l$  (hereinafter referred to as the "hoop modulus") selected to provide a ratio  $R_l$  of hoop modulus to density  $E_l/\rho_l = R_l$  that is lower than the corresponding ratio  $R_r = E_r/\rho_r$  for the rim materials. For rims having several materials such as glass and carbon fiber, the ratio  $R_r = E_r/\rho_r$  that should be used for the purposes herein is larger value of any of the materials in the rim. This relationship ensures that when the inner diameter of the rim 40 grows radially away from the hub at high rotational speeds, the rim liner grows with it.

The rim liner is made from a material that has sufficient strength to transmit the torque between the hub and the rim liner during spin-up of the flywheel and during energy recovery from the flywheel, and has an elastic modulus and elongation capacity in the hoop direction that will allow the rim liner to grow with the composite rim when spun to high speed. Materials that will work have a ratio  $R_l$  that is lower than the corresponding ratio for the rim materials, ensuring that the rim liner grows with and stays in contact with the rim during high speed operation. Examples include various plastics and also brass.

6. To produce a flywheel system and hub in accordance with the invention, a person of ordinary skill in the art would need to know the modulus of elasticity  $E_r$  and the density  $\rho_r$  of the rim materials and the corresponding modulus of elasticity  $E_l$  and the density  $\rho_l$  of the rim liner materials. This information is available from the suppliers of such materials. An example of the calculations used to obtain the values of  $E_r$  and  $\rho_r$

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